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CHEMICAL ANALYSIS OF ORE TAILINGS REFERENCE MATERIALS

FINAL REPORT

BY

ACCURASSAY LABORATORIES LIMITED

Work on this project was conducted under the auspices of the
Department of Energy, Mines and Resources

DSS FILE NUMBER: 09SQ.23440-7-9166-6

DSS CONTRACT NUMBER: 23440-7-9166/06-SQ

SCIENTIFIC AUTHORITY: Dr. C.W. Smith

9pp

MICROMEDIA

ACCURASSAY LABORATORIES LTD.

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METHODOLOGY SUMMARY FOR

CANMET PROJECT

1. Procedure for Gold, Platinum, and Palladium

This procedure involves an initial fire assay of a 40 g. aliquot using lead cupellation with silver inquartation to produce a doré bead of approximately 10 mg. The doré bead is parted with double-strength parting solution to produce a precious-metal sponge which is subsequently dissolved in a 75% strength aqua regia.

Each sample was first matted to homogenise it prior to running a 5 g. pilot sample in order to determine the best flux mix for each individual sample. Once the flux mix has been established, a 40 ± 0.01 g/ aliquot was weighed out and run as above to produce a doré bead. The bead was placed in a 5 ml test-tube and treated with 0.5 ml of 1:3 HNO_3/H_2O solution to dissolve the silver. Without removing the dissolved silver solution, a further 1 ml of concentrated HCl was added to produce a 75% strength aqua regia and the solution vortexed thoroughly, warmed gently for 15-20 minutes and then vortexed again. Finally 0.5 ml of a 2% w/v lanthanum chloride solution was added to prevent inter-element interferences in the atomic absorption and the solution was again vortexed then allowed to settle for 30 minutes. The solutions were analysed by atomic absorption spectroscopy without back-ground correction using the gold line at 242.8 mm, the platinum line at 265.9 mm and the palladium line at 247.6 mm.

2. Procedure for Copper, Zinc, Lead and Cadmium

Approximately 1 g. aliquots of the samples were weighed out accurately to four decimal places, placed in 50 ml conical flasks and treated with 4 ml concentrated HNO_3. The solutions were warmed on a hot plate for 30-40 minutes until no more brown fumes were evolved. After removing from the hot plate, the solutions were further treated with 8 ml. concentrated perchloric acid and then digested on the hot plate until copious white fumes of $HClO_4$ had been evolved for at least one hour (total heating time 3 hours).After cooling the solutions, 4 ml concentrated

hydrochloric acid were added, the solutions were shaken to dissolve any salts and then 10 ml water were added. Finally, the solutions were filtered into a 50 ml volumetric flask and diluted to the mark with water. Each sample was run for copper, lead, zinc and cadmium by atomic absorption spectroscopy, using background correction for all these elements except copper.

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Certificate of Analysis

Dr. C. W. Smith
CANMET - MSL Division
14034 555 Booth Street
Ottawa, Ontario
K1A 0G1

Date: 05/20/88 19 ____

Assay results are as follows:

SAMPLE NUMBER Group #	Ni ppm	Co ppm	As ppm
1A	27.0	43.5	
1B	21.9	35.8	
1C	24.5	35.5	
1D	26.1	42.4	
1E	26.5	42.0	
1F	26.5	39.4	
2A	2193.4	77.0	
2B	2224.2	74.6	
2C	2252.1	81.4	
2D	2233.4	77.0	
2E	2230.2	78.5	
2F	2236.9	74.9	
3A	73.4	149.2	
3B	74.4	140.8	
3C	73.3	140.6	
3D	72.3	139.7	
3E	72.6	141.4	
3F	73.0	136.0	
4A	7868.2	148.6	196.5
4B	7759.2	140.0	201.5
4C	7846.3	142.2	200.1
4D	7755.0	141.5	180.2
4E	7638.9	144.0	204.2
4F	7492.8	139.1	207.2

Per: G. Duncan

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Certificate of Analysis

Dr. C. W. Smith
CANMET - MSL Division
555 Booth Street
18455 Ottawa, Ontario
K1A 0G1

Date: 06/14/88 19 ____

Assay results are as follows:

SAMPLE NUMBER Group #	As ppm
1A	3.9
1B	3.7
1C	4.4
1D	6.1
1E	4.9
1F	4.9
2A	No Sample Left
2B	6.2
2C	3.4
2D	3.8
2E	3.6
2F	No Sample Left
3A	No Sample Left
3B	7.8
3C	8.0
3D	8.2
3E	6.5
3F	5.5
4A	196.5
4B	201.5
4C	200.1
4D	180.2
4E	204.2
4F	207.2

Per: _____

ORIGINAL

REACTIVE ACID TAILINGS REFERENCE MATERIALS

MEASUREMENT PROGRAM FOR RECOMMENDED VALUES

ANALYTICAL REPORT FOR RTS-1

Laboratory: ACCURASSAY LABS. LTD.

Name & tel. no. of principal contact: DR. GEORGE DUNCAN, PRES., (705) 567-6343

Individuals to be credited:
1. .....
2. .....
3. .....

Note: Participating laboratories and individuals listed will be credited in the certification report in a listing such that the sources of reported results will remain anonymous.

COMPONENT MEASURED	CONCENTRATION FOUND µg/g A	B	C	D	E	F	UNITS*	SAMPLE (GRAMS)
SiO_2								
SO_4								
S_{total}								
CO_2								
Fe								
Ca								
Al								
Mg								
H_2O^-								
Cu	595	475	524	611	576	616	µg/g	~40g
Zn	585	423	480	525	489	489	µg/g	
Pb	120	101	113	116	114	116	µg/g	
Ni								
Cd	6.67	6.66	7.66	6.60	8.04	6.67	µg/g	
Co								
As								
Pt	0.063	0.059	0.065	0.071	0.061	0.074	µg/g	~40g
Pd	<0.010	0.016	0.010	<0.010	0.020	<0.010	µg/g	
Au	0.212	0.240	0.212	0.223	0.238	0.201	µg/g	
(other)								

* indicate units of reported measurements; e.g. %, µg/g, oz/ton....
Please attach a methodology summary (see Guidelines).

Please send report to: C.W. Smith, MSL, CANMET, 555 Booth St., Ottawa, K1A 0G1.

REACTIVE ACID TAILINGS REFERENCE MATERIALS

MEASUREMENT PROGRAM FOR RECOMMENDED VALUES

ANALYTICAL REPORT FOR RTS-2

Laboratory: ACCURASSAY LABORATORIES LTD.

Name & tel. no. of principal contact: DR GEORGE DUNCAN (705) 567 6343

Individuals to be credited:
1. .....
2. .....
3. .....

Note: Participating laboratories and individuals listed will be credited in the certification report in a listing such that the sources of reported results will remain anonymous.

COMPONENT MEASURED	CONCENTRATION FOUND						UNITS*	SAMPLE (GRAMS)
	A	B	C	D	E	F		
SiO_2								
SO_4								
S_{total}								
CO_2								
Fe								
Ca								
Al								
Mg								
H_2O^-								
Cu	648	675	694	694	653	662	µg/g	1 Kg
Zn	93.7	83.4	93.8	95.1	93.9	93.8	µg/g	
Pb	64.7	60.6	65.9	63.3	65.0	62.7	µg/g	
Ni								
Cd	12.33	12.47	12.43	14.59	10.55	12.43	µg/g	
Co								
As								
Pt	0.207	0.199	0.271	0.172	0.200	0.203	µg/g	30g
Pd	0.125	0.127	0.112	0.116	0.113	0.122	µg/g	
Au	0.052	0.060	0.041	0.033	0.074	0.028	µg/g	
(other)								

* indicate units of reported measurements; e.g. %, µg/g, oz/ton....
Please attach a methodology summary (see Guidelines).

Please send report to: C.W. Smith, MSL, CANMET, 555 Booth St., Ottawa, K1A 0G1.

REACTIVE ACID TAILINGS REFERENCE MATERIALS

MEASUREMENT PROGRAM FOR RECOMMENDED VALUES

ANALYTICAL REPORT FOR RTS-3

Laboratory: ACCURASSAY LABORATORIES LTD.

Name & tel. no. of principal contact: DR. GEORGE DUNCAN

Individuals to be credited:
1. .....
2. .....
3. .....

Note: Participating laboratories and individuals listed will be credited in the certification report in a listing such that the sources of reported results will remain anonymous.

COMPONENT MEASURED	CONCENTRATION FOUND						UNITS*	SAMPLE (GRAMS)
	A	B	C	D	E	F		
SiO_2								
SO_4								
S_{total}								
CO_2								
Fe								
Ca								
Al								
Mg								
H_2O^-								
Cu	2818	2787	2751	2879	2766	2813	µg/g	
Zn	2057	1792	1803	1872	1867	1701	µg/g	
Pb	159	165	155	151	159	154	µg/g	
Ni								
Cd	17.69	16.27	20.24	17.91	19.77	16.42	µg/g	
Co								
As								
Pt	0.068	0.054	0.067	0.034	0.063	0.068	µg/g	
Pd	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	µg/g	
Au	0.193	0.203	0.215	0.199	0.212	0.195	µg/g	
(other)								

* indicate units of reported measurements: e.g. %, µg/g, oz/ton....
Please attach a methodology summary (see Guidelines).

Please send report to: C.W. Smith, MSL, CANMET, 555 Booth St., Ottawa, K1A 0G1.

REACTIVE ACID TAILINGS REFERENCE MATERIALS

MEASUREMENT PROGRAM FOR RECOMMENDED VALUES

ANALYTICAL REPORT FOR RTS-4

Laboratory: ACCURASSAY LABORATORIES LTD.

Name & tel. no. of principal contact: DR. GEORGE DUNCAN

Individuals to be credited:
1. .....
2. .....
3. .....

Note: Participating laboratories and individuals listed will be credited in the certification report in a listing such that the sources of reported results will remain anonymous.

COMPONENT MEASURED	CONCENTRATION FOUND						UNITS*	SAMPLE (GRAMS)
	A	B	C	D	E	F		
SiO_2								
SO_4								
S_{total}								
CO_2								
Fe								
Ca								
Al								
Mg								
H_2O^-								
Cu	279	274	271	264	282	285	µg/g	
Zn	170	169	178	168	172	168	µg/g	
Pb	92.2	92.5	94.1	92.3	90.9	87.0	µg/g	10g
Ni								
Cd	14.51	16.30	16.15	16.19	14.71	16.20	µg/g	
Co								
As								
Pt	0.060	0.068	0.059	0.056	INSUFF. SAMPLE	0.095	µg/g	
Pd	0.020	0.017	0.013	0.012	INSUFF. SAMPLE	0.012	µg/g	40g
Au	<0.005	0.017	0.020	0.022	INSUFF. SAMPLE	0.032	µg/g	
(other)								

* indicate units of reported measurements; e.g. %, µg/g, oz/ton....
Please attach a methodology summary (see Guidelines).

Please send report to: C.W. Smith, MSL, CANMET, 555 Booth St., Ottawa, K1A 0G1.